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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/755,426	01/12/2004	Xuezhong Jiang	06495 USA	2071

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AIR PRODUCTS AND CHEMICALS, INC.  
PATENT DEPARTMENT  
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EXAMINER

VIJAYAKUMAR, KALLAMBELLA M

ART UNIT PAPER NUMBER

1751

DATE MAILED: 08/31/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/755,426

Applicant(s)

JIANG ET AL.

Examiner

Kallambella Vijayakumar

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 12 January 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

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### DETAILED ACTION

- The examiner has considered the IDS filed 1/12/2004, 05/10/2004, 07/25/2005, 12/05/2005 and 01/26/2006.
- Claims 1-21 are currently pending with the application.

#### ***Claim Rejections - 35 USC § 102***

#### ***Claim Rejections - 35 USC § 103***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

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4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

1. Claims 1-18 and 20-21 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Soltzing (US 7,071,289).

Soltzing teaches a dispersion of polythieno[3,4-b]thiophene in a solvent, spin coating of the dispersion to form uniform thin films, a film with a thickness of about 0.2 micron (200 nm), and devices containing the film (Abstract, C-1, Ln 24-32, C-2, Ln 50 to C-3, Ln 35, C-4, Ln 13-17; C-6, Ln 48-68; C-12, Ln 17-21). The electroluminescence/electrochromic/photovoltaic device or LED components containing the thiophene film include hole-transport layer/hole-injection layer/light emitting layer (C-7, Ln 37-50). Soltzing further teaches modifying conductivity of the thiophene derivative by doping (Abstract, C-7, Ln 7-31). Instant claimed particle size of the conducting polymer being less than 450nm and/or 200nm in the claims will be anticipated over the film thickness of about 0.2-micron, because the particles will be smaller than the film thickness (C-12, Ln 17-21) (Further See, Soltzing, US 2005/0124784, Para 0013, 0022). Regarding the electrical conductivity values in the claims, the prior art composition is identical to that by the applicants and identical compositions have identical properties. With regard to the product by process limitation in claims 1, 8 and 15, the prior art products are identical to that by the applicants, and when the reference teaches a product/s that appears to be the same as, or an obvious variant of, the product set forth in a product-by-process claim although produced by a different process, the claim is not patentable.

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See *In re Marosi*, 710 F.2d 799, 218 USPQ 289 (Fed. Cir. 1983) And *In re Thorpe*, 777 F.2d 695, 227 USPQ 964 (Fed. Cir. 1985). See also MPEP §2113.

All the limitations of the instant claims are met.

The reference is anticipatory.

In the alternative that the disclosure by Soltzing et al be insufficient to arrive at the limitations of the instant claims by the applicants, it would be obvious to a person of ordinary skill in the art to modify the electrical conductivity of the thiophene derivative by doping with dopants to optimize its conductivity to suit the desired application and /or its amount and/or cast a film by spin-coating with reasonable expectation of success, because the prior art is suggestive of these (C-6, Ln 58-64; C-7, Ln 13-50).

2. Claims 1-18 and 20-21 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Soltzing (US 2005/0124784).

Soltzing teaches a dispersion of polythieno[3,4-b]thiophene with a particle size less than 200 nm in a solvent, forming a film by spin-coating or LBL technique, and optoelectronic devices containing the film (Abstract, Para 0013, 0017, 0022, 0030, 0054-0056, 0060-0061, 0081 and 0085). The components of an electroluminescence/electrochromic/photovoltaic device or LED containing the thiophene film include hole-transport layer/hole-injection layer/light emitting layer (Para 0060-0061). Soltzing further teaches modifying properties of the thiophene derivative by substitution, and conductivity by doping (Para 0016, 0057). Regarding the electrical conductivity values in the claims, the prior art composition is identical to that by the applicants and identical compositions have identical properties. With regard to the product by process limitation in claims 1, 8 and 15, the prior art products are identical to that by the applicants, and when the reference teaches a product/s that appears to be the same as, or an obvious variant of, the product set forth in a product-by-process claim although produced by a different process, the claim is not patentable. See *In re Marosi*, 710 F.2d 799, 218 USPQ 289 (Fed. Cir. 1983) And *In re Thorpe*, 777 F.2d 695, 227 USPQ 964 (Fed. Cir. 1985). See also MPEP §2113.

All the limitations of the instant claims are met.

The reference is anticipatory.

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In the alternative that the disclosure by Soltzing et al be insufficient to arrive at the limitations of the instant claims by the applicants, it would be obvious to a person of ordinary skill in the art to modify the properties of the thiophene derivative by substitution and/or its electrical conductivity by doping with dopants to optimize its properties/conductivity to suit the desired application with reasonable expectation of success, because the prior art is suggestive of these (C-6, Ln 58-64; C-7, Ln 13-50).

3. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over either Soltzing (US 7,071,289) or Soltzing (US 2005/0124784) in view of Yamamoto et al (US 5,540,999).

The disclosures on the composition of the polythieno[3,4-b]thiophene dispersion, a polythieno[3,4-b]thiophene film and the device containing the film by Soltzing (US-289) as set forth in rejection-1 under 35 USC 102(b)/103(a), and by Soltzing (US-784) as set forth in rejection-2 under 35 USC 102(b)/103(a) are herein incorporated.

The prior arts are silent about the use of the thiophene derivative film as a hole-injection and hole-transport layer. However, they teach that the layers could be used in the components of an electroluminescence/electrochromic/photovoltaic devices and LED, and do not restrict its use to any particular structure/configuration.

In the analogous art, Yamamoto et al teaches an electroluminescent element containing an organic compound layer of a thiophene polymer as a light emitting layer or a hole-injection-transport layer (Abstract).

It would be obvious to a person of ordinary skilled in the art to combine the prior art teachings to form a hole injection transport layer of an electroluminescent device with the thiophene derivative of either Soltzing (US-289) or Soltzing (US-784) as functional equivalent of thiophene with reasonable expectation of success, because the combined prior art teaching is suggestive of the claimed layer and device.

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**Conclusion**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kallambella Vijayakumar whose telephone number is 571-272-1324. The examiner can normally be reached on 8.30-6.00 Mon-Thu, 8.30-5.00 Alt Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Douglas McGinty can be reached on 571-272-1029. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

KMV  
August 29, 2006.

  
DOUGLAS MCGINTY  
SUPERVISORY PATENT EXAMINER  
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